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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/498,303	02/04/2000	Yong-Pil Han	MIT7941	8629

7590

05/21/2003

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EXAMINER

CULBERT, ROBERTS P

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/498,303

Applicant(s)

HAN ET AL.

Examiner

Roberts Culbert

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Allowable Subject Matter

The previous indicated allowability of claims 12-21 is withdrawn. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the publication to Nakanishi in view of U.S. Patent 6,194,325 to Yang, U.S. Patent 5,922,219 to Fayfield, and U.S. Patent 5,006,795 to Yoshizawa.

Nakanishi teaches a wafer cleaning method in which a mixture of HF and H₂O vapors is applied to the surface of a wafer. The pressure and temperature are controlled during the cleaning/etching process to form monolayer coverage, thus, allowing uniform etching.

Regarding the limitations of placing an electrical charge on the oxide, the various claimed methods of charging a substrate surface are old and well known in the semiconductor art. Yang teaches a method for etching an oxide such as silicon oxide in plasma including a RF powered negative DC bias on the substrate (Col. 6, Lines 11-21). Fayfield teaches a method for etching silicon oxide using U.V. radiation of the substrate. Yoshizawa teaches that an electron beam may be used to produce a positive charge on a substrate

It would have been obvious to one of ordinary skill in the art at the time of invention to bias the substrate positively or negatively in order to generate a uniform plasma, attract ions and improve the etch rate in the well-known manner.

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Claims 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the publication to Nakanishi in view of U.S. Patent 5,336,356 to Ban and U.S. Patent 6,194,325 to Yang, U.S. Patent 5,922,219 to Fayfield, and U.S. Patent 5,006,795 to Yoshizawa.

As applied above, Nakanishi teaches the method of the invention substantially as claimed, but does not teach the use of methanol or isopropyl alcohol in place of the water vapor.

Ban teaches a method for the removal of an oxide layer using HF and a non-aqueous solvent. Ban, like Nakanishi, uses a vapor to prevent the formation of reaction products on the surface. See Abstract. Ban teaches that although it is known to use HF vapor and water vapor (Col. 1, Lines 15-21), a different solvent may be used such as methanol or isopropyl alcohol (Col. 4, Line 57).

It would have been obvious to one of ordinary skill in the art at the time of invention to use a solvent such as methanol or isopropyl alcohol as suggested by Ban in order to prevent the formation of residue as taught by Ban (Col. 2, Lines 10-23).

Regarding the limitations of placing an electrical charge on the oxide, the various claimed methods of charging a substrate surface are old and well known in the semiconductor art. Yang teaches a method for etching an oxide such as silicon oxide in plasma including a RF powered negative DC bias on the substrate (Col. 6, Lines 11-21). Fayfield teaches a method for etching silicon oxide using U.V. radiation of the substrate. Yoshizawa teaches that an electron beam may be used to produce a positive charge on a substrate

It would have been obvious to one of ordinary skill in the art at the time of invention to bias the substrate positively or negatively in order to generate a uniform plasma, attract ions and improve the etch rate.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

May 15, 2003


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700